

## THE PHILOSOPHY OF BIRDS' NESTS AND COMPARATIVE CALIOLOGY IN CONSIDERATION OF SOME LOCAL NIDICOLOUS BIRDS

The old Spanish proverb as paraphrased by Longfellow, "There are no birds in last year's nest," is in many instances more poetic than true, and the bird-lover is blase indeed if the discovery of even an empty nest does not sometimes awaken a lively curiosity and a thrill of admiration for the builder.

Caliology is a most delightful and instructive department of Ornithology and should appeal to the ultrahumane, especially since the study does not necessitate the destruction of life and the collection of its bewildering variety of specimens ranging from the most crude to the most curious and artistic types, is just as practical as skins or eggs.

The site, position, composition, architecture and workmanship of the nest may reveal something of the builders' habits, haunts, structure and position in the Avian scale.

The subject is indeed full of possibilities, for the nest represents the sole constructive work of the owner, the tangible asset of a more or less mechanical energy set in motion by certain physiological conditions or stimuli; the revelation of a most interesting phase of that mysterious innate propensity called instinct, which we are told, has the appearance of reason and knowledge, exceeding as it does the intelligence and experience of the builder; to which is added traditional habits, adaptability and perhaps a modicum of originality, should we follow the older school in the belief that birds have much the same sense facilities for acquiring knowledge that ourselves possess and though much inferior, are like us in mind and emotions. Authorities differ in their conception of the origin of instinct. In general, that of natural selection through the elimination of the unfit, seems the most plausible, and that of the effects of habit through successive generations, a contributing factor. Though the truly instinctive nature of nest-building has never been fully established, Wallace in his rejection of the hypothesis based his contention on erroneous premises and his main conclusion that nest-building is essentially imitative, lacked proof. It has been argued that a nestling knows less of its nest than of its general surroundings and that if birds were imitative there would be no reason why a species should not sometimes pattern after allied

species instead of each species constructing a standardized nest after its own kind. In colonial species it might be possible for the immatures to pattern after the adults, and there would be nothing revolutionary in this thought for it is easily proven that birds are mimetic in song and frequently in the wild state imitate the notes of other species. The writer has identified the song notes of some 18 species uttered by a single, talented Catbird in the hedge and as many call notes given by a Starling nesting in the cornice.

After the vital continuous instinct of self-preservation (that of subsistence and avoidance of harm) hardly less powerful is the periodic or seasonable breeding instinct, which for brief and critical periods takes precedence of the first, and it may be necessary for the perpetuation of the species that it should, since many species would be individually safer without a fixed abode.

The breeding cycle is one of orderly sequence full of dominating influences and associations naturally leading from one to another. No doubt the first phase is that of the awakening of sexual and homing instincts portending the vernal migration to the place of birth, followed by the fight for exclusive rights to sufficient territory, commonly within the province of the male; then comes the period of courtship, selection of exact site for nest, in which the female commonly appears to have the last word; nest-building, deposition of eggs, incubation and care of young naturally follow, when the song period may suffer an eclipse or the more virile species of comparatively short breeding cycle may inaugurate a second or even a third cycle of similar sequence of minor actions beginning with courtship. Many species of diverse feeding habits may occupy the same ground apparently without coming into actual competition in the matter of food. Since most of the individuals have more or less restricted and distinctive haunts during the breeding season and employ the building materials close at hand, it may be assumed that the inward impulse to build is quickened by the presence of the requisite and traditional materials about its feeding station. However, instinct does not enable it to select the proper matter unerringly, for the female of many species often rejects at the last moment materials brought to the site by herself or more frequently by the male, who seems to lack discrimination most often.

In nest-building the female commonly takes the most promi-

ment part and is, in fact, the architect and builder. It is therefore of physiological origin, for this action is quite similar to that of a mammal seeking the seclusion of a bed or den remote from disturbances to give birth to its young.

Although sufficiently complete studies of the home life of most of our birds are yet a desiderata, it appears that both sexes of many species of the groups including the Puffins, Auklets, Shearwaters, Petrels, Herons, Raptors, Cuckoos, Kingfishers, Woodpeckers and Swifts, commonly assist in nest-building; while the Hummingbirds are the only group below the rank of the Passeres in which the males are known to bear no part of the burden.

In the Passerine group there appears a bewildering amount of variability even in species closely allied. Many in which the males are highly colored render little or no assistance: Bobolink, Yellow-headed and Red-winged Blackbirds, Baltimore Oriole, Evening Grosbeak, House Finch, Crossbill, Redpoll, Goldfinch, Cardinal, Rose-breasted Grosbeak, Dickcissel, Scarlet Tanager, Summer Redbird and many of the Warblers. It apparently also includes the Wood Pewee, Crested and Alder Flycatchers, White-throated, Fox, Song, and Swamp Sparrows, Brown Thrasher, and Robin. The male Phoebe, Cedar Waxwing, some of the Vireos, Purple Martin, Mockingbird, and Bluebird assist sometimes.

Species in which the sexes are similar or alike, often both sexes assist: Least Flycatcher, Crow, Savannah and Chipping Sparrows, Swallows, Plainopepla, Shrikes, Ovenbirds, Wrens, Nuthatches, Chickadees, Gnatcatcher, Bush-Tit, and Catbird. Doubtless there are both individual and geographical exceptions to the above list.

The most potent factor governing the selection of the site of a bird's nest is impossible to determine. Habit is strong but ancestral habit yields to changed conditions; the social instinct in colonial species is especially strong; the protective instinct is also powerful, since severe persecution will drive many of the terrestrial nesters to cliffs or trees; the condition of young at birth is considered by some writers as by far the most important cause.

The lower aquatic families from the Grebes to the Frigatebird are almost exclusively insular, colonial, terrestrial, and primitive in nesting habits, and, further, with the exception of

the Grebes, Loons, Murrelets, Murres, and Auks, all of their young are born helpless and remain a long time in the nest.

Of those in which the chick leaves the nest almost immediately, the Grebes, which are not insular, and the Loons, which are neither insular nor colonial, form rude nests not inferior to that of the average nidicolous bird of the lower orders, and the less typical nidifugous Murrelets, Murres, and Auks habitually deposit their eggs upon the bare rock, comparable to the lack of nesting material of many of the nidicolous species of the lower orders.

The Puffin, Auklet, Guillemot, Dovekie, Shearwater, Petrel and Tropic-bird doubtless originally deposited their eggs on the open ground (as individuals of some of these species occasionally do yet) until persecution forced them to seek shelter in the crannies of rocks, or in the absence of sufficient quarters of this nature, to excavate burrows, where the lack of sunlight contributed materially to retard the development of the young, if not to acquire the typical nidicolous condition. It is true that some species of the lower orders are arboreal: the Common and Red-faced Boobies, Anhinga, Florida and Mexican Cormorants, California Brown Pelican and Man-o-War Bird, nest in low trees or bushes, situations less isolated than burrows or precipices but affording something of the security sought.

It is therefore evident that it could hardly have been the condition at birth that determined the nesting site and materials of the lower groups, but conversely, self-protection, and possibly led to the nidicolous condition. Perhaps the best index to the site of a bird's nest can be found in its food habits.

Professor Rennie, in his little volume entitled "Bird Architecture," written almost a century ago, took his cue from Aristophanes, an ancient Greek dramatist, and introduced the birds as artisans according to the form or nature of their nests: miners, masons, carpenters, basket-makers, weavers, tailors, cementers, felt-makers and parasites; also ground, platform and dome-builders; suggesting a somewhat similar method of grouping for this paper.

(1) Doubtless the most primitive form is that in which the egg is dropped upon the bare earth or rock without preparation beyond perhaps a slight hollow. Naturally this form is confined to the lowest Nidicolas—the Albatross, Rodger's Fulmar, Pintado Petrel, Tropic-Bird, Blue-faced, Blue-footed and Brew-



ster's Boobies, and should also include the Paroquet and Crested Anklets, Black, Mandt's and Pigeon Guillemots, Dovekie, Bulwer's and Ashy Petrels, though these species deposit their eggs upon pebbles or rock spalls.

The Laysan Albatross exhibits an incipient tendency for nest-building when the sitting bird reaches out to pick up sand to build around the nest a ridge several inches high.

(2) The earth burrowers also represent the lower forms and with some notable exceptions, almost the most primitive types of the diving birds, including the Puffin, Auklet (two species), Guillemot (one species), Shearwater and Petrel, also the Burrowing Owl, Kingfisher, Bank and Rough-winged Swallows.

The burrows of the various species of Puffins are often curved and generally extend three or four feet, seldom far below the surface. Bent says that the work of digging falls chiefly upon the male and that he is at times so intent upon this work as to suffer himself to be taken by hand. The inner toe is well adapted for this work as it is strong, curved and sharp and the other toe nails are but little inferior.

Apparently the male Rhinoceros and Cassin's Anklets share with the female in the labor and Dawson states that the Pigeon Guillemot uses both beak and claws and is forced at the outset to maintain herself in midair. Montgomery says of the Slender-billed Shearwater, that the process, with intervals, requires six weeks. Fisher in describing the excavations of the Wedge-tailed Shearwater on Laysan Island, remarks that it shoves the loose earth under its body and kicks it in little jets far behind as it lies first on one side and works a foot and then shifts to the other.

Turner relates that he found the Horned Puffin nesting on the higher cliffs on the Alentian islands where foxes were found and on islands where foxes were absent, generally at the base of cliffs, and Jones found some nests of the Tufted Puffin beneath the thickly matted salal bushes without a semblance of an earth burrow, on Bird Reservation off the coast of Washington.

Many of the Anklets, Guillemots, Dovekie, Fulmars, Pintado Petrel and some of the Shearwaters and Petrels, nest under boulders or in fissures of the rocks; doubtless all are burrowers in the future should occasion arise and may offer a hint of the probable origin of the tunnel-nesting habit.

An enlarged cavity in the earth at the end of the hole forms the nest and the slight concavity may be bare of nesting material but is often scantily lined with materials close at hand, a little dead grass, plant stems, leaves or twigs.

The Burrowing Owl appropriates the burrow of the ground squirrel and enlarges the hole. An inhabitant of treeless plains would naturally seek a nesting site similar to its kind, if not a tree-cavity then a cavity in the ground. Bendire states that the loosened dirt is thrown backward with vigorous kicks of the feet, the bird backing gradually toward the entrance and shoving the debris outward as it advances. The original lining was probably grasses and rootlets, now mostly dried cow or horse manure. The Florida form constructs its own burrow.

The Belted Kingfisher bores a nearly circular tunnel sometimes perfectly straight, again diverging at different angles near the surface in sand or clay banks. The nest chamber is on a slightly higher level than the shaft and may have a scanty lining of fish bones or coarse grass blades. The Kingfishers are solitary in contradistinction to all the rest of the burrowers, and some forest-haunting species are said to nest in tree cavities.

The labor of perforation is accomplished by the Bank Swallow with closed bill according to the observations of Rennie; beginning at the centre and working outward, the bird consequently assumes various positions tending to throw the gallery out of line and sometimes quite tortuous. The time consumed, including the lining of grasses and feathers, is said to be from four to fourteen days.

This cosmopolitan is better known in England by the name of Sand Martin, where it has been found in exceptional instances, nesting in crevices in masonry or old ruins, in tree cavities and it has even been known to burrow in decayed wood.

I have found burrows of the Rough-winged Swallow near Howellville quarries, less than ten feet up the bank along a public road. It burrows in a similar fashion to that of the preceding species, though it is perhaps more apt to use its feet in scratching out the dirt. In the Chester and Schuylkill valleys the Rough-wing usually nests in the crevices or pockets of large stone culverts, abandoned lime kilns and rock fissures, from which it removes the disintegrated mortar or clay and lines the cavity with swamp grass and a few leaves of the swamp willow. In California it has been found nesting in adobe walls

and knotholes. Though less colonial than the Bank Swallow, it is still possible that the tunnel-forming habit originated in the social instinct fostered by a former segregation in rock crannies.

The nidification of these two species would appear to vary very considerably from the family standard, but the Swallows are confirmed mud dabblers, especially the Barn and Cliff Swallows, and Dr. Rich once observed nests of the latter in close proximity to the burrows of a colony of Bank Swallows in a sand spit along the Big Sioux river, and found some of its eggs in the burrows. Even the Eastern Martin builds a little mud dike at the entrance of its nest, and the nest of the Western Martin has recently been found in the drainpipes under the eaves of a school house, one nest having a layer of mud, then grasses, lined with acacia leaves. The Tree Swallow conforms to the family standard in its love of a darkened nest-chamber and the character and material of lining.

All earth burrowers appear to use both bill and feet in the construction of their tunnels and the male always shares in the hard work. It is remarkable that species of so extreme types and diverse equipment should be able to attain the same end in nesting site, and demonstrates that structure has little to do with this form of nidification.

(3) The more or less concave platform is a primitive type of the open nest, especially adapted to the ground or cliff nesting habit and by the enforced transition to an arboreal site, less adapted to the situation than to the bird of aquatic or terrestrial feeding habits. This type includes the Common and Red-faced Boobies, Anhinga, Cormorants, Pelicans, Man-o-War-bird, Noddy, Roseate Spoonbill, Ibises, Bitterns, Herons, Pigeons, Hawks, Owls and Cuckoos, probably nearly all of which were at no remote period ground or cliff nesters, as some are yet. Many are especially adapted for terrestrial nesting and at some disadvantage as arboreal nesters, in fact the only compensation appears to be the protective features of an elevated nest. The Hawks, Eagles, Kites and probably the Owls may have evolved from an arboreal or at least a cliff-dwelling ancestor and their nests are often much more substantial.

Generally the cliff or tree builder utilizes sticks or twigs, while the ground nester frequently uses lighter materials in the main equivalent to a lining. The Marsh Hawk, for instance, uses sticks only when necessary to raise the nest above a wet

ground. In the first trials the stick base of the cliff and tree breeders was obviously not a matter of knowledge or expediency, but the logical conclusion of an indiscriminate collection of materials by the inexpert builder, only to have the lighter materials blown away and the heavier remain.

The floor of the fertile Chester valley occasionally rises 100 feet or more to form a series of knolls parallel with the high hills on either side, the first land to emerge in a chain of islets when in the ancient days the waters broke through the hills and slowly drained into the sea. On these knolls in detached deciduous groves, the Black-crowned Night Herons have existed perhaps since time immemorial. It may be more than a coincidence that all of these heronries have been placed in the western side of the groves, facing up the valley toward the first drained area and that the birds enter and emerge from this side though some have the disadvantage of contiguous roads.

It is not necessary to go beyond 1872 when the heronry situated near the cantonment of Wayne's Continentals at Valley Forge were shot up and the survivors settled near Port Kennedy, two or three miles further down the valley. When the timber of this grove was cut a few years later, the birds simply moved one field east to a similar situation, where a nucleus has existed with a few years interruption down to the present time, and from here the increase flowed back to the former site as soon as the timber became large enough to bear nests, comprising the twin colonies reported in 1891 to be the largest extant in this part of the country.

The westernmost colony much depleted, maintained an average of about 100 adults from 1900 to 1905 when the timber was again cut the following winter and the Valley Forge colony re-established in 1906, after an abandonment of 34 years, in a detached grove quite close to the old site. This heronry of 43 nests increased to 150 nests in 1907 by the accretion, I since learned, of the easternmost Port Kennedy colony with which it was so closely affiliated. The return of so interesting a species, en masse, to its ancestral nesting ground after a period doubtless several times longer than the life of any individual of the colony may be due to the habit of the adults of this communal group revisiting the site during migrations until it became a familiar resting place and naturally would be resettled whenever the birds were dispossessed, though it was the most ineligible from the



standpoint of timber growth and privacy, of the several groves in the neighborhood. The annoyance began in 1908 and though the maximum of newly built nests was attained on May 9, 1909, continuous persecution drove all but four pairs with small young, to seek refuge in the easternmost grove at Port Kennedy and at Red Hill about a mile further down, and definitely abandon it the next year.

I am reliably informed that the Red Hill heronry was established in 1886, however I did not visit it until 1914, when 90 nests continued to show evidence of occupation although recently "shot up." It was further reduced the next year to 60 nests, the same time that the Valley Forge colony was once more reestablished with 50 nests and apparently had a prosperous year on the former site, since in 1916 there were 127 nests, but the gentlemen farmers in the vicinity accused the Herons of a well developed taste for young Mallards, and on April 15, 1917, I observed only about 15 birds engaged in nest-building and 33 others in nearby timber apparently undecided; however they soon after departed to swell the lower colonies.

Though largely nocturnal this species is at a great disadvantage in beginning to nest before the leaves are formed when the birds and nests may be seen at a distance. I have observed the entire Valley Forge colony of adults perched upon the tall saplings in the rear of their heronry, looking, I fancied, like gigantic exotic blossoms on long slender stems; as they awaited the departure from under their nests of a party of idlers.

The Red Hill heronry continued the brutal sporting ground of some inconsiderate persons and on July 20, 1920, there were probably 45 nests inhabited by young belated more than a month. The following year the wood was removed and a powder magazine erected, resulting in a marked increase in the easternmost Port Kennedy colony, now the sole remaining heronry in the valley. This heronry met with a setback in 1922 when so many young perished during a storm, but was in force in excess of 300 adults the season following and due to the humane farmer had a most prosperous year.

The nests of this picturesque species are placed in the highest available crotches and topmost branches of slender young ash, oak, chestnut, cherry and poplar, 25 - 75 feet above the ground. The nest is a very good example of the platform type, although sometimes a mere bundle of sticks in the least suitable branches—

probably the work of the immature. The nests are grouped as close as possible and the bill only is used to gather sticks from the ground or twist twigs from the tree, at which both sexes appear to work from a few days to a week to rear a compact structure, well tramped down and finished slightly concave. This type of unlined nest, I have reason to believe, was peculiar to this part of the country in Wilson's time.

While the excreta whitewashes the nest, tree and ground for a radius of several feet, it does not kill the tree but on the contrary it accelerates its growth, while a most luxuriant vegetation covers the ground except immediately under the nest.

The Mourning Dove, like most of its family, is social and gregarious, but not essentially colonial. It is an adaptive species nesting from the ground to upwards of 50, though usually 5 to 15, feet, mostly in evergreens or thickset deciduous trees. I have found it on top of bare stubs and once upon the broad railing of a rose-embowered balcony, and it has been found in various localities on ledges, boulders, roofs, wood piles and in cavities. The nest has a base of a few twigs, a scant layer of grass and weed stalks and lined with grass rootlets. I have noticed the male make numberless trips of 40 feet to gather material in bill for the female to arrange and complete in two days. Dice remarked that while many other species building nests of greater bulk, gather all the material possible on a single trip, this species carries a single straw at a time and when this is accidentally dropped, the bird continues to the nest before making another trip.

The Hawks are natural cliff and tree nesters, usually building a compact structure capable of withstanding the storms of several seasons. The Cooper's Hawk compares favorably with the best as a builder. Like the Broad-wing, both sexes carry material in talons or beak, much of it broken from the live tree: also bark scale lining.

The more slovenly Broad-wing is adverse to the construction of an entirely new nest, builds at a lower level, is most tenacious to locality and has a perfect mania, shared in a lesser degree by all the Buteos, and occasionally by some of the Cormorants, Hawks, and Cuckoos, for plucking green sprigs, blossoms or leaves from nearby trees to serve as an additional lining after the deposition of the eggs, to be renewed constantly after incubation has advanced or while the young are helpless. To the

writer this simply signifies recurrence of the earlier stages of the nesting cycle coincident with a renewal of sexual activity after a short period of inactivity. Since the early nesting species are accustomed to gather more or less light twigs broken directly from trees, it is natural that in the repetition of the building phase the same thing should reoccur, even though the terminal twig should bear bud, leaf or blossom, according to the advance of vegetation.

[ To be Continued in Next Issue ]

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#### FOUR DAYS' OBSERVATIONS AT A GUNNING CAMP ON MARTHAS VINEYARD

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APRIL 18, 1924

Down to camp on Friday. A fine sunny day but very windy. There are usually myriads of Gulls and Terns at the Woods Hole wharf, but there were very few in evidence this trip. Pretty early in the season.

We saw great banks of Scoters, apparently all *Oedemia deglandi*, feeding in the sound on the way over to the Vineyard. On the beaches between Oak Bluffs and Edgartown the Gulls were fairly numerous. Three species of the Gulls were in evidence — Herring, Great Black-backed, and Laughing. They were all standing huddled up on the shore looking as though they hadn't a friend in the world. Flying overhead were a few Terns, mostly Common Terns, but we also noticed a few Roseate Terns and several Least Terns.

The ponds en route all contained small flocks of Lesser Scaup and a few American Golden-eyes.

We arrived at camp about 2:30 p. m., but as it began to storm we contented ourselves with cleaning up and airing out the camp for occupancy.

APRIL 19

Rain and wind greeted us at 6 a. m. and lots of it. The inclement weather didn't prevent Fred and myself from starting out at 7 to see what birds were out in the storm as well as ourselves.

We found a pair of our mated Geese nesting on the shore of the lagoon on the point.